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Citation:

Delaware River Basin Commission. 2001. The Lower Delaware Monitoring Program: 1999 Survey of the Lower Non-Tidal Delaware River and Pilot Study for a Long-Term Water-Quality Monitoring Network. Delaware River Basin Commission, West Trenton, NJ.

Acknowledgements

Much thanks to the agencies that provided water-quality analyses related to this study:

United States Environmental Protection Agency, Region II, Laboratory Branch, Edison, NJ 08837. EPA Personnel included: Kevin Kubik, Irwin Katz, Dr. Dewey Johnson, Deborah Kay, Norma Samia, and summer students Misena Pacius & Halima Da Costa.

NJDEP Bureau of Marine Water Monitoring, PO Box 405, Stony Hill Road, Leeds Point, NJ 08220. Personnel Performing Analyses: Robert Connell, Robert Schuster, Eric Feerst.

Thank you to all the landowners who allowed access to study sites on your property:

Jacobs Creek: Ms. Judy Foritano
Fiddlers Creek: Mr. & Mrs. T. Goiten
Moore Creek: Mr. Bill Pizzini, Iron Bridge Farm
Pidcock Creek: Bowman's Hill Wildflower Preserve
Tinicum Creek: Mr. William Edmonds

DRBC staff participating in fieldwork during the 1999 bacteria survey:

Robert Limbeck, David Wilcox, Todd Kratzer, Edward Santoro, Dr. Thomas Fikslin, Dr. Namsoo Suk, Jason Tsai, Gregory Cavallo, Pamela V'Combe, Karl Heinicke, Paul Scally, and Paul Webber.

The Lower Delaware Monitoring Program

1999 Survey of the Lower Non-Tidal Delaware River and
Pilot Study for a Long-Term Water-Quality Monitoring Network

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Executive Summary

The Delaware River is within a day's drive of 40% of the U.S. population, and the Lower non-tidal Delaware (the "Lower Delaware", or the reach located between Trenton, NJ, and the Delaware Water Gap) is intensively used for water-based recreation, tourism, public water supply, and industry. Unlike other segments of the non-tidal Delaware River, the Lower Delaware is more populated, more densely developed, and therefore more susceptible to water-quality impacts. In 2000, portions of the Lower Delaware were designated as part of the National Wild and Scenic River system. The Lower Delaware River Management Plan (Lower Delaware River Wild and Scenic River Study Task Force and National Park Service, 1997) designated the DRBC as the lead agency for monitoring and development of a water-quality management plan for the reach. By implementing a long-term monitoring program along the Lower Delaware, the DRBC, with state, federal, and non-governmental partners, can generate sufficient information to document existing water-quality and provide the basis for water-quality management decisions in this portion of the Delaware River and its tributaries. To serve planning needs, DRBC designed an intensive monitoring program to define, protect, and enhance existing water-quality.

This report presents findings of a June through August 1999 water-quality survey of the Delaware River and tributaries located between the Delaware Water Gap and Trenton, NJ. The survey included three bacteria sampling events and one water-quality survey. Fecal coliform and enterococcus bacteria were analyzed from the samples. The study area included 74 sampling locations at tributaries, bridges, and access areas along 75 miles of the Delaware River. Purposes of the survey were: 1) to assess water-quality; 2) to compare bacterial quality to the 1987 survey (DRBC 1988); and 3) to provide a basis for water-quality management plans that will maintain and enhance water-quality and designated uses. The survey was designed to support the Lower Delaware River Management Plan; improve the data record necessary for 305(b) assessments; and extend DRBC's monitoring efforts to cover the entire non-tidal river.

Findings and Recommendations

1. Bacterial water-quality of the Delaware River and its tributaries has apparently improved since 1987, considering the fecal coliform standard alone.

2. Fecal coliform and enterococcus counts are greater in near-shore areas of the Delaware River than in the main channel, though low levels were observed in the Delaware River.

3. Fecal coliform counts may have been affected by dilution in the Delaware River and large tributaries.

4. Fecal coliforms are valuable general water-quality indicators, and provide a tool to assess effects of urbanization. In future study designs, large tributaries should be broken into study units of 80 square miles or less, enabling study of population growth versus water-quality at an increased level of resolution for resource management decisions.

5. Enterococci appear to be more sensitive a measure of primary contact bacterial water-quality than fecal coliforms. Use of the enterococcus criterion would lead to a greater number of water bodies listed as impaired in Section 305(b) reports. Thirty-five tributaries exhibited

enterococcus densities above the federal guideline and New Jersey standard, as opposed to 11 tributaries exceeding the fecal coliform standard.

6. DRBC should consider establishing enterococcus standards for the non-tidal Delaware River, based upon federal criteria or existing water-quality.

7. Fecal coliform, E. coli and enterococcus testing should be added to DRBC's suite of basic water-quality parameters, measured as part of the Lower Delaware fixed monitoring network.

8. The Delaware River exhibits periods of oxygen super-saturation and high pH. This may be caused by excessive aquatic plant growth, possibly due to elevated nutrient inputs, especially during periods of stable and low flow. Further evaluation of river nutrient dynamics and aquatic plant productivity may indicate the underlying cause.

9. The upper limit of DRBC's pH stream quality objective (pH 8.5) should be evaluated since it is inconsistent with state standards.

10. Jericho Creek (Bucks County, PA) and Cain's Run AKA Warsaw Creek (Hunterdon County, NJ) displayed concentrations below dissolved oxygen standards (though the data set was very limited). Gallows Run (Bucks County, PA) displayed lower than normal dissolved oxygen saturation values. These tributaries should be investigated in greater detail by the states, DRBC, or a combination thereof. Agencies, non-governmental organizations, and local residents should cooperatively implement solutions to repeated water-quality problems.

11. The Delaware River exhibited lower counts of fecal coliforms and enterococci than tributaries. Other relatively bacteria-free Lower Delaware waters included the Lehigh River, Tohickon Creek, and Paulins Kill. Based on our very limited observations, these waters may be acceptable for primary contact recreation.

12. A water-quality monitoring network was established, and 2200 data were collected from 74 sites. These data begin a long-term data record for the Lower Delaware River corridor, which will contribute to a management approach that prevents degradation of this portion of the Delaware River, and assists in protecting the water resources of tributary watersheds.